

# RESTFul Web Services ( & Workflows )

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# RESTFul Geo-Services Business Case

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- **Simpler**
  - Well known HTTP operations (Stateless)
  - Consistent Patterns Across All Services
  - Resource/User-Oriented (No need to know operations)
  - Well-Documented
  - Low Barrier of Entry (Mass-Market Target, Browser Environment)
- **Reliable, Scalable & Performant**
  - Asynchronous Transactions
  - Caching, Load Balancing, Firewalls
- **Interoperable**
  - No SOAP, WSDL, Schema Version problem
- **Visible Internals**
  - XPDL 2.0/ BPMN 1.0 (Industry Standards)
- **Discoverable**
  - GeoRSS/Atom Feeds (Available Readers & Aggregators)
- **Secure**
  - Users & Web Services Authentication In Federated Environment



# RESTFul Services - ROA For SOA

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- RESTFul = REST +
  - AtomPub
  - GDATA
  - OpenSearch
  - GeoRSS/Atom, KML
  - Security
    - OpenID / AX (Attribute Exchange to get to user assigned role)
    - OAuth\* (pre-approved transactions)
- Targeted Audience: Mass Market



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# Everything Is A Resource

*End User's Perspective*

*Customer is King!*

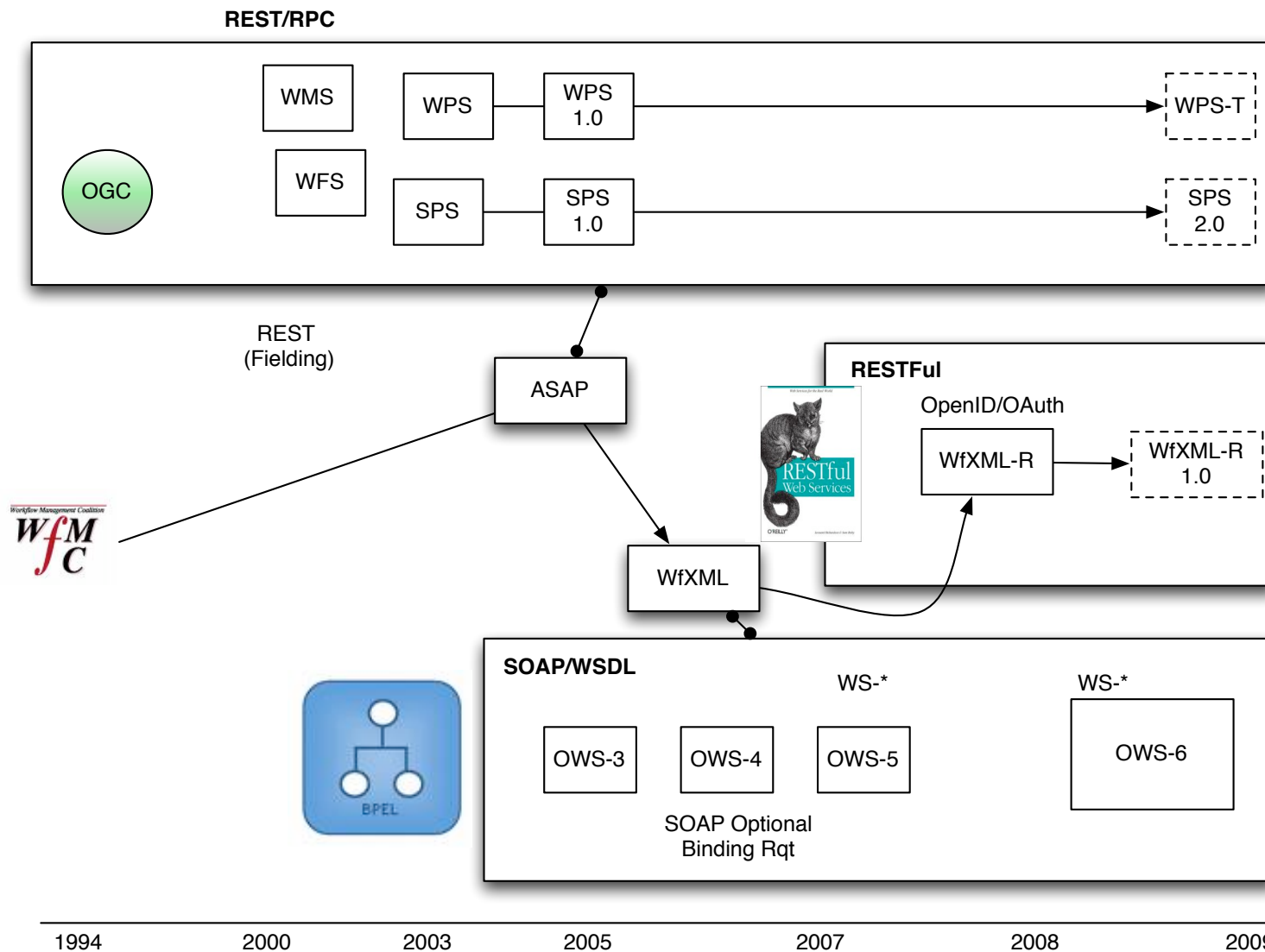


# Origins

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- SUN ONC RPC (1980), DCE (1990-2005), CORBA(1991-2008)
- REST/RPC (2000) = RPC over HTTP
  - Operations Are Exposed
- SOAP/WSDL (2003)
  - Same Thing With A Message Wrapper
- RESTFul / ROA (2007)
  - The Resources Are Exposed

# Evolution of Workflows at the OGC



# OWS-5: Advent of RESTful Workflows

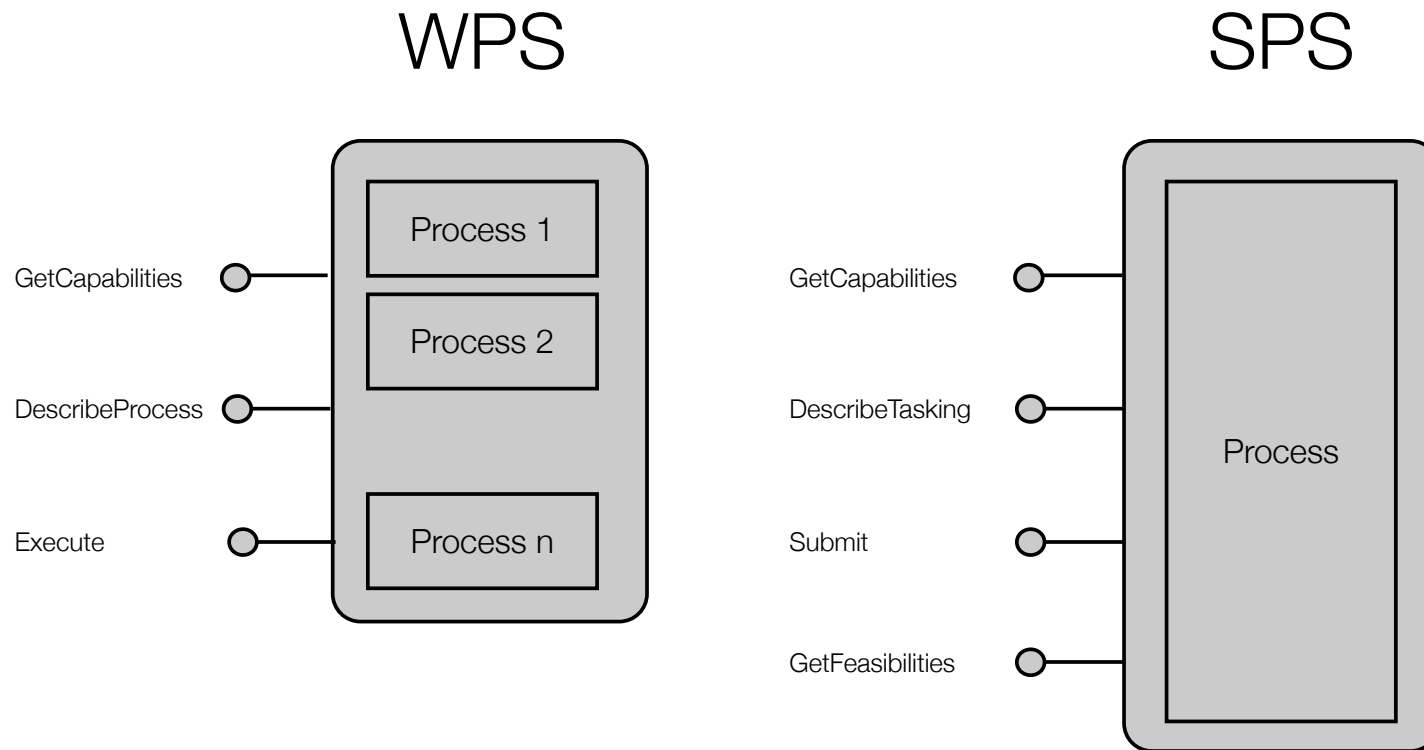
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- WfXML-R
- Lessons Learned
  - OGC RESTful Services Are a Real Possibility
  - RESTful Security is Possible With OpenID/AX/OAuth\*
  - Further Harmonization of WfCS/SPS/WPS Is Possible



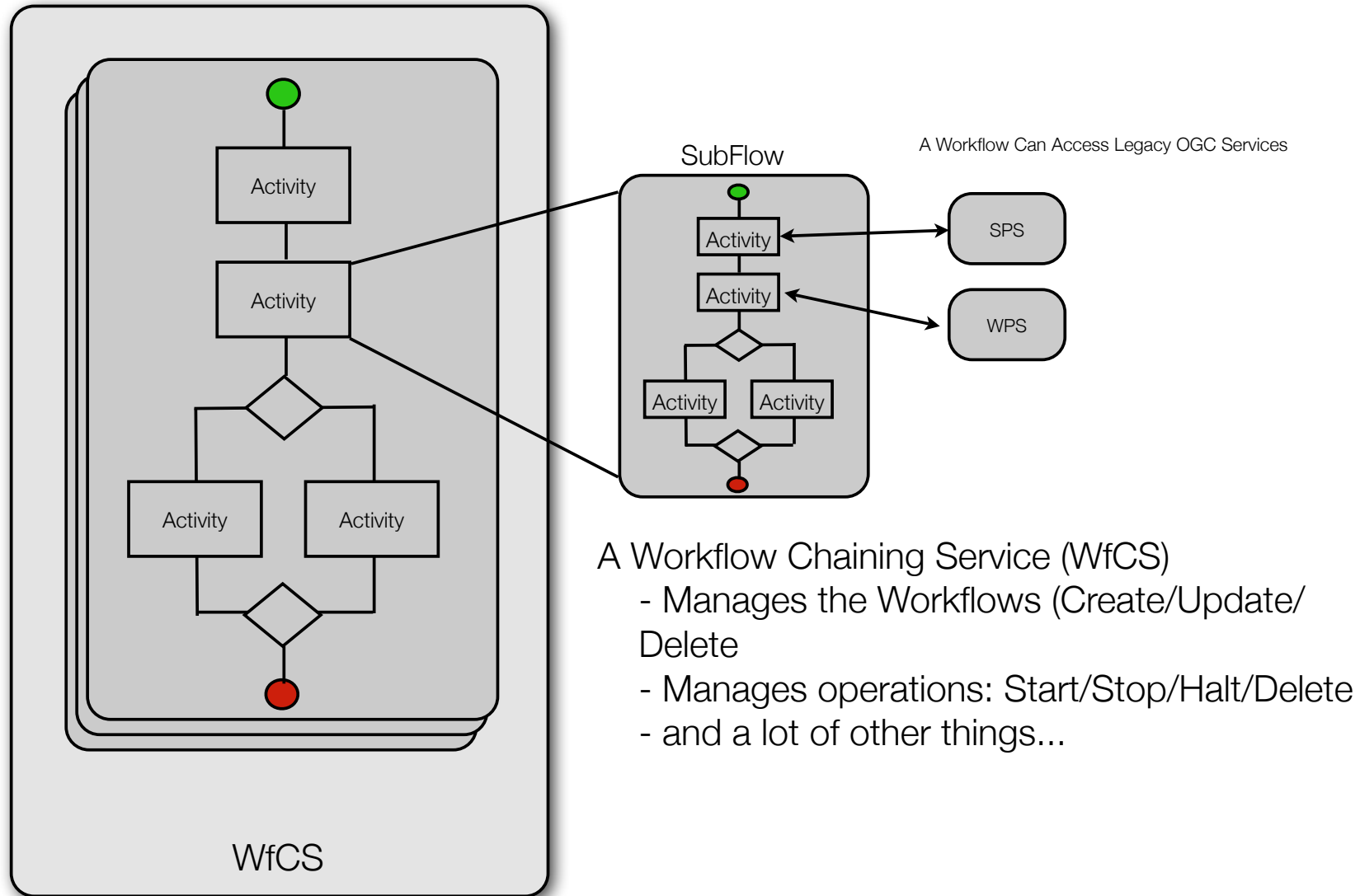
# WPS & SPS Differences?

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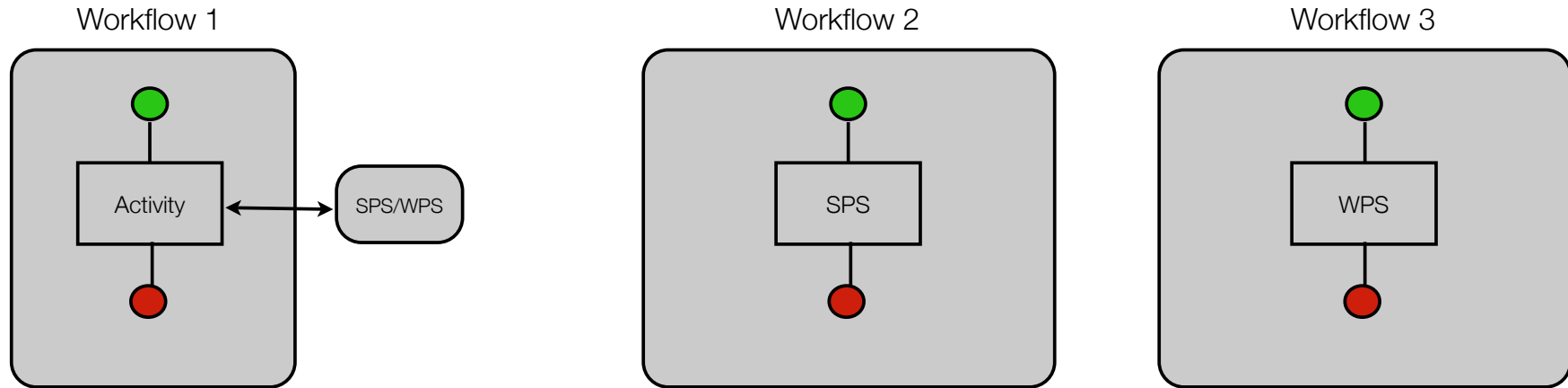
So SPS is really a WPS with one process with option to check if process is feasible for given parameters (which would be nice to have for a WPS)  
They both need asynchronous capability & security

# Workflow Orchestrating OGC Web Services



# Degenerated Cases

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A Workflow can implement SPS or WPS capabilities as custom activities

SPS = WfCS with one Workflow (or may be two)

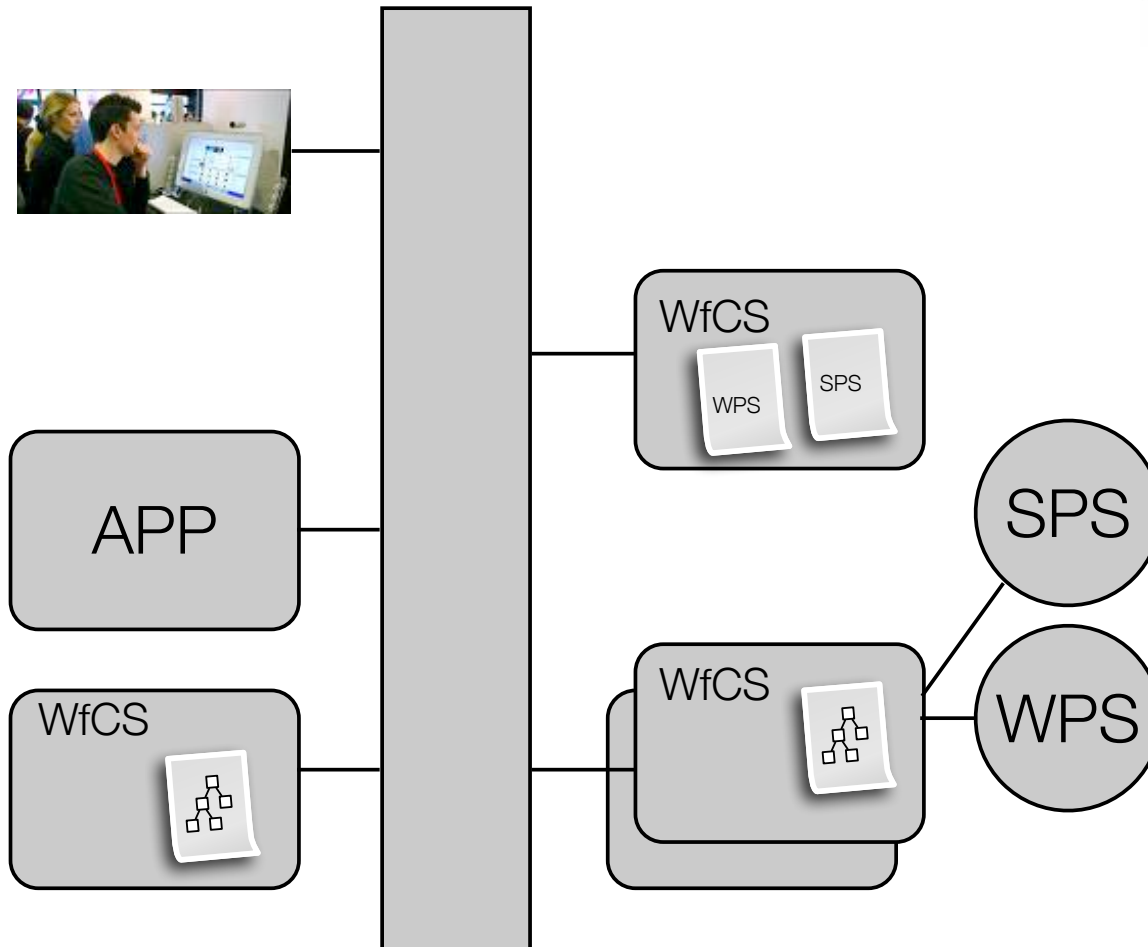
WPS = WfCS with several workflows (one per implemented process, WPS-T is free)

So.... One specification instead of three would be nice.

# Secure WfXML-R Standard API



WfXML-R



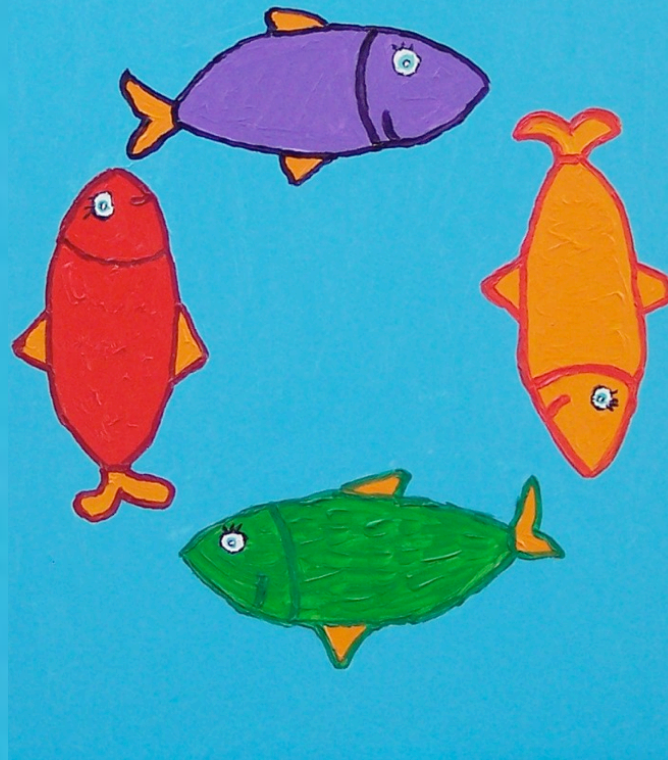
So, Everything Is A Workflow

Workflow=High-level Operation

# WRONG!!!!

RPC

Workflows



REST/RPC

SOAP/RPC

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Since Everything Is A Resource,

This is Obviously Not Possible In A RESTFul World.

So, What Is A Workflow?

# Workflow

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From Wikipedia, the free encyclopedia



- **A workflow is a depiction of a sequence of operations**, declared as **work of a person**, work of a simple or complex mechanism, work of a group of persons, work of an organization of staff, or machines. Workflow may be seen as any abstraction of real work, segregated in workshare, work split or whatever types of ordering. For control purposes, workflow may be a view on real work under a chosen aspect, thus serving as a **virtual representation of actual work**.
- A workflow is a model to represent real work for further assessment, e.g., for **describing a reliably repeatable sequence of operations**. More abstractly, a workflow is a pattern of activity enabled by a systematic organization of resources... into **a work process that can be documented and learned**.



# What Is A Workflow?

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- Visual Depiction Of Activity Sequence Is Critical (BPMN)
  - Process Transparency
  - Process Documentation
  - Teaching Aid
- Humans Can Be An Active Participant In Asynchronous Process
- Virtual Representation of Actual Work
  - ☒ Workflow Is a Virtual Resource
  - ☒ Can Be Published as a Proxy For That Resource

Let's Not Make The Same Error Again:

From A User Perspective, A Workflow Should Not Be Published As An Operation

# Best “Workflows As Resources” Example

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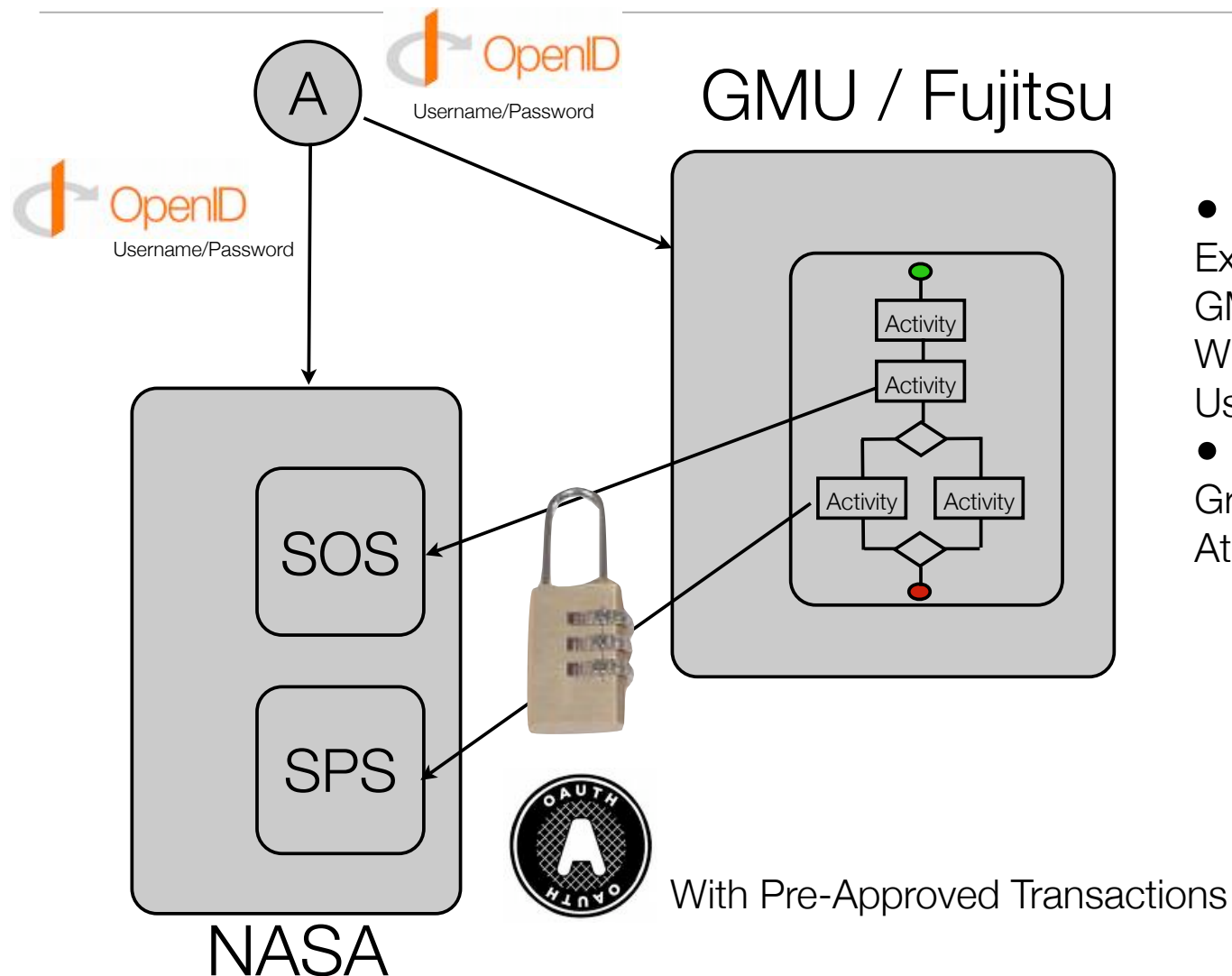
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# Last Challenge...

## Security

# Required Security Use-Case Lowering The Limbo Stick



- User Wants To Execute Workflow On GMU Machine Without Giving Up His Username/password
- User Wants To Grant/Revoke Access At Will

# RESTFul Security Scope

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- Client/Server Security Implementation Scope
  - OpenID Implementation: 2 Days (Server) (1 Data Point)
  - OAuth Implementation: 1 Day (Three Data Points)
  - Soap Security Implementation: 1 Month (Two Data Points)
- Next Step
  - We need A Few Trusted OpenID Providers with AX Capabilities for Roles